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SCIENTIFIC AFFAIRS

No. 710

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CONTENTS

STRUCTURAL PROBLEMS OF CZECHOSLOVAK ENGINEERING

Prague JEMNA MECHANIKA A OPTIKA in Czech No 5, May 81 pp 113-116

[Unsigned Article]

[Text] We stated in an article entitled "In the Atmosphere of the CPCZ Congress" (No 4/1981) that the main structural problem of Czechoslovak engineering is inadequately developed electronics, particularly its modern component base, which makes it totally impossible to handle higher generations of computer systems, to develop cybernetization and robotization. More than that, electronics is penetrating into an increasingly larger number of branches of mechanical engineering. The eighties and nineties will be years of application of microprocessors. Without microprocessors, it will be impossible to sell many products, including those which are exported today on a large scale to nonsocialist countries. It is obviously true that in 3 to 5 years a unit of an exported product will include about 20 percent electronics, 5 to 6 percent equipment for protection against airpollution, and 20 percent more accessories such as pumps, compressors, hydraulic equipment, pneumatic equipment, heavy-current electrotechnical gear and bearings.

It is assumed that in addition to their use in computers, microprocessors will also be used during our Seventh Five-Year Plan in telecommunications equipment, measuring and control instruments, electric household applicances, photographic instruments, scientific instruments, electrical installations, forming and turning machinery, plasticization machinery, textile machines, and packing machines. Additional fields will be included in the following five-year period. The only area where they are not expected to be applied is the manufacture of railroad freight cars. All this indicates the urgency and seriousness of the structural problem of what is called the electronics industry. What is our situation? We mentioned this problem once before in our periodical. Now we are concerned with summarizing it and especially with determining its future!

The rapid advance and development of the use of electronics are brought about especially by the following facts:

a) electronics can be a substitute for man's mental capacities and can multiply their individual functions;

b) this substitution of man's mental capacities takes place at low energy levels and in increasingly smaller parts of matter, which results in unusually low demands for energy, material, and time in application and operation;

c) due to the characteristics specified in sub a) and b), the introduction of electronics in the manufacture of machinery, instruments and equipment results in a qualitative increase of their original parameters, which in turn makes it possible to create new information systems and cognitive and decisionmaking processes in all areas of human activity;

d) the scientific-technical development of electronics is one of the most dynamic processes. It shows an increase of technical parameters of a whole order in the course of several years, because it expands and multiplies several times the assortment of products to satisfy needs during a decade;

e) microelectronic technologies of the primary base lead to constant decreases of dimension and weight, which are accompanied by decreases of production costs and prices of functional units at rates which are unprecedented in the history of mankind (price decreases by three orders in 20 years), with analogical impacts on decreases of the dimensions, weight, production costs, and prices of the final products of the electronics industry;

f) as a result of the effects described sub a) to c), the production technologies of entire industrial branches can be changed, with significant results obtained in improvements of the quality of products, production economy, rationalization of energy consumption, and reduced demands for manpower, and also in the technology and activities in the nonproduction sphere. Finally, in the area of personal consumption, the development is becoming a significant factor in the operation of households and arrangements for the use of time off from work.

In view of the present situation and the growing trends in the application of electronics in other production of the machine industry, it is necessary to evaluate the share of electronics as a whole in the production of ministries of mechanical engineering (communication engineering, electronics and parts, computers, automation, and so on). We must state at this point that in Czechoslovakia this ratio is 8 to 10 percent, while in industrially advanced countries it varies from 13.5 percent (Sweden) to as much as 25 percent (Belgium). Annual production increases in these states were also substantially higher in the past years than in Czechoslovakia. And we do not give examples of countries such as Japan and the United States, which are in the forefront of the development of electronics in the world. One should add that a certain change is expected in this unfavorable development in the Seventh Five-Year Plan. At the same time, what is most important by far is not so much the development of final production, such as the production of computers, television sets, transmitters and so on, but first of all the development of the production of parts, particularly microprocessors.

However, the problem of structure, under the conditions which exist in Czechoslovakia, is not covered merely by pointing out the main structural disproportion, which is electronics. One must examine other questions as well. We believe that in the case of a state which has such a high share of exports (and must have a higher share yet), the proper export structure is that which corresponds to the demand for machinery on the world market and also takes in consideration the future structure of mechanical engineering in advanced industrial states, i.e, the fields of mechanical engineering in which those states are investing today.

During the last period of 10 years and for the next 10 years, demands for imports in the world (an increase of imports of machinery of more than 6-8 percent annually) are concentrating in the following fields of mechanical engineering (in a decreasing order):

--machines for the production of electric power from nontraditional sources;

--installations for oil extraction from the seas;

--parts base of the fourth generation (microprocessors);

--equipment for protection against air pollution;

--computers;

--equipment for long-distance data transmission;

--nuclear reactors;

--gas turbines;

--aviation motors;

--electric medical instrument;

--electric measuring control and regulatory equipment;

--pneumatic and hydraulic elements;

--electromechanical tools;

--chemical installations;

--rubber industry installations;

--construction machinery;

--lifting and transportation equipment (internal transportation in factories);

--telecommunication equipment;

--airconditioning equipment;

--electric furnaces;

--foundry equipment;

--compressors and pumps;

--packing machines;

--color television equipment;

--food processing machines;

--trucks;

--installation of steam and hydroelectric power plants;

--electric automobile equipment;

--roller bearings;

--electric household appliances;

If we examine the list of these fields, we find that the Czechoslovak machanical engineering industry has in its production program all the production fields for which demand in the world is above average, with the exception of the equipment for the production of energy from nontraditional sources, which does not necessarily mean only, for example, the use of solar energy, and with the exception of equipment for oil extraction, electronic products of the fourth generation and effective equipment for prevention of air pollution. At the same time, it is characteristic that the given four production fields which we cannot handle, at least not at a supermodern level, (fourth generation = microprocessors, highly efficient air filters and separators), are precisely the fields in which the annual increase of imports amounts to more than 15 percent.

And so one can assume that if these fields show the highest demand for imports, then their development rate should also be above average.

1980/1975 Production Development Rate

Computers	174	Airconditioning equipment	149
Nuclear reactors	[illegible]x	Electric furnaces	148
Gas turbines	177	Foundry installations	129
Electric medical instruments	164	Volumetric compressors	114
Measuring and regulatory instruments	175	Turbocompressors	184
Pneumatic elements	131	Pumps	156
Hydraulic elements	223	Packing machinery	163
Electromechanical tools	105	Color television	---
Chemical installations	135	Food-processing equipment	170
Rubber-processing machinery	192	Trucks	156
Construction machinery	195	Steam turbines	102
Transportation equipment	172	Water turbines	165
Installations for manufacture of building material	156	Passenger cars	156
Telecommunications equipment	206	Car accessories	140
		Roller bearings	156
		Electric Household Appliances	141

The table shows clearly that the predominant majority of the production fields listed above were developing during the Sixth Five-Year Plan at a rate which was above average. As a result of it, their share in the production of the entire mechanical engineering industry increased from 22.3 percent in 1975 to 30.4 percent in 1980.

In spite of that, one cannot say that we would experience a surplus of these products in the national economy, or that these products would take care of exports. On the contrary! The national economy could "feed" more computers than it gets, and at the same time domestic consumption competes only with exports to the socialist countries. The situation is similar with regard to nuclear reactors. The deficit in taking care of the requirements in terms of measuring, regulatory, and automation equipment during the Sixth Five-Year Plan amounted to several billion korunas. In spite of the high rate of growth of the production of hydraulic elements, these accessories are not available for construction machinery, agricultural machinery, cars, mining technological equipment, excavators, lifts, presses, forming machines and so on. With regard to installations for the chemical and rubber industries, demands from the USSR and domestic requirements for investment construction are not covered. Also, we could export more to nonsocialist countries. The production which is traditionally in short supply is the production of tools of all kinds and highly productive and mechanized casting installations are not available for purposes of modernization of foundries. Pumps and irrigation equipment can be exported advantageously to economically underdeveloped countries and irrigation in our agriculture could be expanded. Transportation equipment is lacking for open-pit and deep-mining operations. With regard to food industry equipment, the USSR is calling for larger deliveries. Trucks are exported on a larger scale to both areas of the world, car accessories have been a bottleneck for a long time, and so on.

This means that there is a clash between the foreign trade requirements and domestic investment construction in specific production facilities. The only solution is to keep increasing production faster than before. Naturally, when we talk about increasing the manufacture of final products, we must in the same breath also consider proportional development of the production of accessories. Although the rate of speed of the production of accessories kept surpassing by far the production rate of the mechanical engineering industry (the production of general engineering and heavy engineering industries increased 37 percent, accessories 55 to 60 percent), the production of accessories was the main drawback which hampered continuous manufacture and completion of final products. There were not enough cables, distributors, fittings, pneumatic equipment, transmission gears, crankshafts, car accessories, products made of plastics, piston rings, couplings, electromotors, batteries. The annual deficit of accessories amounted to as much as 4.5-5 billion korunas at the end of the Sixth Five-Year Plan. At the same time, the production structure of the Czechoslovak mechanical engineering industry shows a certain paradox in the fact that even those production fields which are developing in the world at a rate which is below average, are also lagging behind in Czechoslovakia. This applies, for example, to rolling installations, metallurgical and coking installations, railroad, rolling stock, installations for the light industry, and so on.

And so, if we wanted to give a general characteristic of the main structural problems of the Czechoslovak mechanical engineering industry; we could make the following statement:

--the main disproportion of the structure in the quantitative sense consists today in the low share of electronics in the overall volume of machine building, and in the quantitative sense it consists in the fact that the production of modern, progressive components is lagging behind;

--in other areas, the Czechoslovak mechanical engineering industry in essence correctly reflects the trends in terms of the structure and mutual relationship of the fields which are developing adequately and those which are developing at a below-average rate. However, the head-start rate of progress of the so-called progressive fields does not take care of the needs of the national economy;

--the development rate of the so-called accessories fields during the past period did not eliminate the disproportion which exists between the production fields of final products and accessories;

--the decrease of demand for products of some production fields which is manifesting itself in the world, does not appear as yet in Czechoslovakia and in other socialist countries because of investment demands within these countries.

As a result of all this, the products of perhaps every field of the Czechoslovak mechanical engineering industry are in short supply, and efforts to carry out the so-called dampening-prevention drives have very limited results.

Such an analysis is important both for the Seventh Five-Year Plan and, especially, for the long-range outlook. However, it is also necessary at the same time to note other very interesting and telling symptoms.

The given fields are unquestionably those which had and continue to have the highest import trends in the capitalist countries (and consequently the highest export trends in Czechoslovakia). These trends are undoubtedly strengthened, with certain exceptions, in imports of the socialist countries. They are an index of the conjunctural trends in the production and exports of states with mechanical engineering industry operating for export. However, there are countries which show the most progressive technical trends and thereby also those of the export currents of tomorrow. These countries are selecting only some production fields from the set given above, and they are giving special attention and support to them. On the other hand, they are discontinuing certain types of products which they export today, because they know that they will soon be competing with those states which have already acquired the know-how in the manufacture of such products and will appear on the market. And so, we are holding a sort of first place in the set given above, where the technical level is so high that only a few products in the world can reach it. And then we have fields of some sort of second order, which still represent and will continue to represent in the next 5 to 7 years the top level in the world in terms of demands for technical research and development. However, many manufacturers of machinery have already acquired the know-how in these areas today.

From this point of view, it is interesting to learn about what Japan is doing since it is a country which provides an index of technical progress and expansion of exports in the world. It seems that they have gambled everything on electronics and, as part of it, on the development of microprocessors. They have at their disposal a microprocessor which can store 16,383 bits of information per square centimeter of silicon. They now have the know-how to store 64,000 bits per square centimeter, and they also have a superchip with 250,000 bits per square centimeter. In addition, they have developed the use of an electronic ray, which can store 1 million bits per square centimeter. They have the know-how for the manufacture of the latest reactor motors for the American F15 fighter plane. A consortium of three Japanese firms has signed an agreement about the development of a new generation of Rolls Royce aviation motors.

With the help of large state subsidies, they are now orienting investment construction and future production in terms of production intensification in relation to automation, they are investing in the area of integrated circuits, industrial robots, small industrial computers, digitally contolled machine tools, reactor technology, equipment for protection of theliving environment. Which means everything for automation, everything for labor productivity. The progress made in the use of microprocessors has made it possible now for robots to operate at the hourly "wage-costs" of $4.60, while an American worker employed on a car assembly line earns $16 per hour. Discussions are held to the effect that 50 to 75 percent of the jobs of manual workers can be replaced with industrial robots by the end of the century. The Japanese are very drastically reducing investments in production fields where they are flooding the world with their products, in the automobile and shipbuilding industries. That says a lot. They are holding down production in those areas which are beginning now to be captured by industrial states not in the forefront of industrial progress.

The law on subsidies of the mechanical engineering industry and production of data-processing equipment which has passed in 1978 is to help in providing technological support for the key industries in Japan. This law, the most important tool among many supporting legal provisions, is to be in effect until 30 June 1985.

The mechanical-engineering and electronic industries, including the production of data-processing equipment, represent the core of legally established support of key branches of economy which are highly demanding in terms of technology. These industries are expected to provide not only for a considerable productivity increase, but also for innovation impulses which in many ways affect all spheres of the processing industries.

The main interest of the Japanese economic policy under specific conditions (exceptionally high dependence on imports of raw materials, especially crude oil) is further specialization in high-quality products which are technologically demanding. That assumes an even more significant intensification of technological research and development.

The main goals of the law are rationalization and automation on the basis of systematic technological research and development. Additional goals are as follows:

--improvements of production quality;

--introduction of new production technologies, particularly those which lead to savings of material and energy;

--standardization and normmaking, by which parts of machinery are to be made more interchangeable, and as a result the machines could be used for multiple purposes;

--respect of the requirement concerning protection of the living environment;

--greater use of sources of raw materials, which were not used at all so far, or were used inadequately;

--recycling of industrial and household waste material.

These goals are supposed, on the one hand, to make it possible to expand further the technological head start against foreign competition in those industries where the Japanese industry holds a leading position (electronics) and, on the other hand, to catch up in those branches where technology is lagging behind (software in computer technology, communications engineering, information processing), and where Japanese industry has not reached the international level as yet. At the same time, special significance is attributed to reduction of the dependence of Japanese industry on foreign licenses and know-how.

A characteristic feature of the law is that it deliberately gives up subsidies of all branches of given production fields. The law rather stresses preferential treatment of branches and unit groups in the mechanical-engineering industry, where subsidies are considered to be desirable, for example, in the electronics industry and communications engineering.

The elasticity of the law is to be increased by provisions for the possibility of adjustments under certain conditions (for example, in cases of unexpected breakdowns in the development of the economy as a whole).

A total of 89 groups of products or production fields are designated as sectors which are to be subsidized. The key points in the industry of electronic instruments are: instruments for radiation measurements, and also medical, navigation and ultrasound instruments, laser technology, electronic tubes, structural elements, piezoelectric ceramic parts, peripheral instruments for digital computers, elements with liquid crystals, and increased sensitivity of magnetic tapes for tape recorders.

In the mechanical-engineering industry, attention is to be paid particularly to the following tasks: digital machine tools, metal-forming machinery, increase of production speed of machine tools, decrease of energy consumption of conveyor belts, decrease of energy consumption of refrigerating equipment, increase of output of textile machinery decrease of noise of industrial sewing machines and construction machinery, stricter hygienic regulations concerning food-processing machines, more rigid requirements concerning environmental protection in the case of paper-mill machines, increase of precision of instruments for technical measurements, increase of safety of packing machines, decrease of noise of wood-processing machines or foundry machinery, reduction of noise of tractors, greater accuracy of control of certain values, decrease of noise of forgoing presses, achievement of top technological level of the software of fourth generation computers, and higher quality of sintered metals.

The key points given above indicate priorities in the technological policy of Japan up to the middle of the eighties. At the same time, one can also deduce from the goals of the structural policy assigned to industry the conclusions concerning the key points of Japanese exports in the forthcoming years.

The example of Japan can tell us a great deal in our considerations about the most suitable structure of the Czechoslovak mechanical engineering in the future. This structure will be discussed in forthcoming articles.

5668
CSO: 2402/70

BRIEFS

NEW COAGULANT DEVELOPED--Developed by the State Research Institute of Textiles in Veverska Bityska, Traumacel is a preparation in the form of a yellow powder which stops capillary bleeding within 2 minutes. It can be woven into bandages which are less bulky than traditional ones. Its Pruban version is a hollow bandage which can be quickly donned on any wounded part of body; Svutin is an adhesive type of bandage. Traumacel can also be used in surgery of brain, heart, liver, kidney and other organs, as well as plastic and other types of surgery. [Prague PRACE in Czech 29 Jul 81 p 6]

PRODUCTION OF GIANT CRANKSHAFTS SCHEDULED--Production of new types of crankshafts for marine engines has begun at the Klement Gottwald Iron and Engineering Works in Ostrava. Its plant No. 3 is being retooled for production of giant superheavy crankshafts which weigh up to 152 tons and measure between 10.6 to 12.75 meters long. [Prague PRACE in Czech 31 Jul 81 p 3]

CSO: 2402/77

PLANS, PROBLEMS OF RADIO ENGINEERING ENTERPRISE NOTED

Budapest NEPSZABADSAG in Hungarian 29 Jul 81 p 3

[Excerpts] The basic job of the REMIX Radio Engineering Enterprise is to provide domestic consumers with modern, passive RC elements and hybrid circuits. The factory makes electronic parts such as resistors, condensors, potentiometers, thick and thin-film integrated circuits with insulated substrate. The three factory units employ 3,700 persons of whom 472 are party members. The units are located in Szombathely, Tiszakecske and Budapest.

During the past five-year plan, the enterprise was able to implement only approximately half of its development and reconstruction plans. It lacked the credit to switch to production of more up-to-date products. It was unable to find the wherewithall to develop the production technology, to buy and put into operation highly productive, automated production lines needed to attain its goals.

Problems were aggravated by the fact that only a part of its 274-million-forint machine park met current requirements. As of the first of January, 1981, the value of that part of the machine park that had to be completely written off amounted to 113 million forints. This will require replacement.

Electronic equipment is playing a definitive role not only in the electronics industry but in all spheres of production. To meet the growing demand, the industry must invest 500 million forints during the Sixth Five-Year Plan and achieve a production increase of at least 75 percent. As an example, fabrication of integrated circuits must grow from small to large-scale production and amount to 3 million units per year.

To increase efficiency, five main departments and six departments have been merged and the number of managing personnel has been decreased by 33 persons. This has simplified and streamlined management and decision making.

Despite technical development which will cost half a billion forints, no major wage increases are in sight. Wages at the enterprise are modest, amounting to an average of 36, 132 forints annually. Although every effort will be made to retain worker loyalty through higher wages for better work, the enterprise plans to increase certain fringe benefits to the tune of 100 million forints during the Sixth Five-Year Plan even if this means paring away funds from other investments.

CSO: 2502/90

APPLICATION OF MAGNETIC DATA CARRIERS DESCRIBED

Warsaw BANK I KREDYT in Polish No 4, Apr 81 pp 106-108

[Article by Zofia Porembska: "Preparation of Data Carriers--A Condition for Proper Data Processing"]

[Text] In the 1960s work began on automating banking operations which led to a significant expansion of information science in the bank. The systems, above all encompassing accounting work, that at present are functioning in the bank are the System for Banking Operation [SOB], the National System for Electronic Clearing of Savings [KSERO], the Savings-Checking Accounts System [ROR], and the Systematic Savings Accounts Calculations System [ROSO]. According to 1980 data:

--the SOB was in operation in 171 operating and integrated branches, that is, 36 percent of all such branches. This system processed 55.7 percent of all operations. In addition, the SOB was applied in 35 special branches (about 15.7 percent of all such branches);

--the KSERO was in operation in 290 special and integrated branches, which represents 95.1 percent of all such branches. This system processed 98.6 percent of the total number of current savings accounts and about 98.6 percent of all operations for this form of savings.

In addition to the indisputably significant improvements achieved in branch operations with the application and operation of the above-named systems, a number of problems, frequently difficult ones to surmount, especially concerning equipment used by the bank, also appeared. One of them will be mentioned here, namely the problem relating to equipment to verify data carriers. In 1980, 348 out of 423 automated bank branches, or 82.3 percent of the total, verified data carriers on Addo-X punch-adders, that is, on equipment to verify paper data carriers. (At the end of 1980, the bank had 976 Addo-X punch-adders in operation.)

The remaining branches, 75 or 17.7 percent of the total, verified data carriers are on Seecheck, Mera-9150, System M-10 and Mera-100 magnetic systems. The use of magnetic data recorders--thanks to the possibility of checking data corrections of data while verifying data carriers--permits errors to be eliminated from operating files and, at the same time, decreases processing time at a computer center.

The increasingly higher computing power of computers which the bank uses (for example, ZETO [Electronic Computer Computation Centers] computers, and computers in our own centers) require increased productivity from workers employed in the data-preparation process, as well as improvements in and verification of the quality of their work. The most extensive use possible of multiposition equipment systems to record and initially prepare data on magnetic carriers, which over the next several years should completely replace the now traditional methods of preparing data on paper carriers, will undoubtedly fulfill these conditions. Punch-adders are technically obsolete devices for verifying data carriers; their productivity is relatively low, and the scale of errors produced is high. The age of the machines used by the bank branches and the poor quality of the paper produced in Poland to produce perforated tapes also contributes to the problem. The initial purchase of Addo-X punch-adders for the bank was made in 1966, the latest purchase was in 1976. The possibility of continuing bank operations during the period magnetic data-carrier preparation equipment replace paper data-carrier preparation equipment has become very limited over the past several years. Undoubtedly the trend of development of Poland's electronics industry, which in a 20-year period has not completely eliminated or minimized the dependence of its production on foreign licenses (and thus on foreign-exchange funds necessary for their purchase), has affected the progress of automating bank operations, especially in the number and quality of equipment installed in the bank. It should be noted that the production of hardware, especially less complicated equipment, for example, machines to verify data carriers, need not be imported from the capitalist countries and can be produced in Poland or in close collaboration with the socialist countries. Such a trend in developing the hardware base in Poland would permit the automation of bank operations to be accelerated and also eliminate the difficulties now confronting us in this sector.

Till now, all foreign-produced hardware and most domestically produced hardware have been foreign-exchange purchases, including 41 Mera-9150 systems with work stands (including Seechecks), 55 M-10 System stands, and 55 Mera-100 devices. The main principle of installation directs that multikeyboard equipment be installed in the larger urban centers and Addo-M-10, Mera-400 and Mera-100 data carrier verification equipment be installed in small and medium branches. Table 1 lists the locations of the discussed equipment.

The extensive replacement of Addo-X punch-adders with equipment to record data on magnetic data carriers is not now possible because of financial reasons. If financing and foreign-exchange conditions are favorable, in 1981 the bank intends to purchase:

--7 Mera-1950 systems for the Bialystock, Katowice, Warsaw and Zielona Gora regions;

--200 Mera-100 devices to supplement existing equipment in the Bydgoszcz, Wroclaw, Torun, Pilsk and, eventually, the Opolski voivodship regions;

--on an experimental basis, one Mera-400, with the idea of using these devices more extensively in the future in bank branches.

The planned purchase in 1981 of magnetic equipment to verify data carriers will not resolve to any great extent the difficult problem of replacing paper data-carrier preparation equipment with magnetic data-carrier preparation equipment;

it also does not appear realistic for the future. Considering Poland's complicated economic situation, the bank cannot count on a foreign-exchange allotment to permit it to realize its initial goal, which is to replace by 1985 the Addo-X punch-adders with magnetic data-carrier preparation equipment. The exchange on average of about 200 Addo-X punch-adders annually for magnetic equipment to verify data carriers has been planned. This means that most branches, especially the smaller ones, will probably continue using the punch-adders up to 1990.

Table 1. Location of magnetic data carrier preparation equipment

Rozmieszczenie urządzeń przygotowania danych na nośnikach magnetycznych

1 Lp	2 Oddziały wojewódzkie	Mera-9150 3 jednostki centralne	Mera-9150 4 klawiatury	5 M-10 klawiatury	6 Mera-100 urządzenia
	Razem 7	41	503	55	55
	w tym: 8				
1	Bydgoszcz	—	—	55	—
2,3,4	Włocławek, Toruń, Piła	—	—	—	55
5	CE	5	76	—	—
6	Warszawa	7	77	—	—
7	Łódź	3	45	—	—
8	Katowice	5	54	—	—
9	Poznań	3	43	—	—
10	Kraków	3	36	—	—
11	Wrocław	3	36	—	—
12	Gdańsk	3	40	—	—
13	Szczecin	2	24	—	—
14	Kielce	2	20	—	—
15	Częstochowa	1	10	—	—
16	Lublin	2	20	—	—
17	Bielsko-Biała	1	10	—	—
18	Siedlce	1	80	—	—
19	Bank Handlowy	—	4	—	—

Key:

1. Item
2. Voivodship branches
3. Central processing units
4. Keyboards
5. M-10 keyboards
6. Mera-100 devices
7. Total
8. Including

A certain amount of improvement in this sector in the future can result from the use by the bank of the TELZIS [Telegraph System for the Collection of Report Data], developed by the Administration for the Mechanization and Automation of Statistical Reports, patterned after the one already operating at the GUS [Main Office for Statistics]. The initial attempts to use a similar system already have been started by the bank; this system is based on transmitting data via teleprinters directly to the Mera-9150 equipment. More extensive use in banking of this system, which uses teleprinters to transmit data, is expected in 2-4 years which undoubtedly will release some Addo-X punch-adders for use by those bank branches which need them most.

In view of the continuous growth in bank operations, the distribution to the branches of fewer pieces of data-carrier preparation equipment than was assumed, will require special attention to the full use of equipment now on hand, magnetic as well as paper, and the proper maintenance of this equipment. This problem requires that automated branches and voivodship regions immediately conduct an indepth analysis of equipment usage and the optimal use of all data-carrier equipment that are operated in a given area, especially magnetic data-carrier equipment, in order to fully utilize certain reserves that still exist there. The ideal would be to develop for every automated branch and voivodship region a system of operation in this sector which would permit this difficult task to be accomplished.

Multiyear operation of the Addo-X punch-adders increases the frequency of machine failures and causes longer shutdowns of utilized machines, but at the same time the failure rates for this equipment can be decreased significantly by proper and more frequent maintenance and continuous technical inspections. Increasing the frequency of equipment inspections and proper equipment maintenance will assuredly increase equipment life. And what does the technical service of these machines at the NBP [Polish National Bank] look like today? In Poland, the following are in operation:

--17 RWNs [Regional Repair Shops];
--27 PNs [Repair Points].

It appears that the number of repair points is too small because technical service for operational Addo-X punch-adders is wanting in 16 bank regions in the 49 voivodships that are now automated. This means that when machines fail in these regions, technical service must be obtained from other regions. It takes much longer to get a diabled punch-adder repaired because it takes a longer time for a mechanic from another region to come and make a repair. From practice we know that at times a branch must wait for a month or longer for a mechanic to arrive. These unusable machines cause long delays in bank branch operations and many other related problems. We also know that today each punch-adder is subject on average to maintenance only once per month and even once every 2 months, which, considering the present technical state of the machines, is not often enough. To avoid frequent machine failures and their associated shutdowns, a daily technical inspection of the punch-adders used by the branches is a necessity. Thus, selecting the proper path to assure optimal use of all data-carrier preparation equipment, especially magnetic equipment, and to maintain as long as possible the full technical efficiency of equipment to verify paper data carriers in each branch and region are exceptionally important. It appears that the basic conditions for obtaining the discussed results can be defined precisely:

--first, by developing a goal-orientated model of operations for the near future concerning new applications and maintenance of currently operating systems. The model should be adapted to existing conditions in each voivodship regarding equipment on hand and the time reserves of operating equipment, especially magnetic equipment, to verify data carriers. Here one should also consider operating the Mera-9150 system on two shifts. Operating an expensive machine for two shifts would be advisable and would allow the elimination in the future of the Addo-X punch adders.

--second, the development of an organizational-technical concept in a time frame which would facilitate proper technical servicing of equipment, directed above all toward expanding the technical maintenance service network for Addo-X punch-adders. The creation in each automated region of a two-person technical maintenance service team would be a correct action. An even better solution would be to have such service available at each automated branch that verifies data carriers on Addo-X punch-adders.

It would also be worthwhile to think about means of providing in the voivodships technical service for equipment to verify magnetic data carriers.

Third, a guarantee by the bank to provide spare parts in sufficient numbers for the RWNs and PNs for equipment used by the branches. This is an extremely serious problem because the lack of essential spare parts can cause shutdowns of data-carrier preparation equipment and even their withdrawal from use.

In signaling the above problem, I believe that with the active collaboration of the regional units with the Department of Information Science, we will be able to overcome the difficulties looming in the area of data-carrier preparation equipment in the present difficult foreign-exchange situation such that the bank could execute in full, as adapted to these possibilities, the plan of applications for 1981 as well as disallow any slowdowns in the present and future automation of bank branches.

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DATA ON FIRST INDUSTRIAL ROBOT, 'REMT-1'

Bucharest CONTEMPORANUL in Romanian 8 May 81 p 6

[Article by Gheorghe Sasarman]

[Text] In this month of May 1981, at the Electromotor enterprise of Timisoara, the first technical tests in our country are beginning on a manufacturing station serviced by a robot. Of Romanian design, built entirely with domestic parts, REMT-1 (Electromotor Robot No 1) has five degrees of freedom (horizontal, vertical, turning, as well as arm extension and twisting), is intelligent (can be programmed to perform complex operations, can be reprogrammed, knows the position of its hand--which can carry parts of up to 50 kg, conducts its activities under constant dialog with the machine-tools with which it collaborates, and can be taught to correct its movements), and is extremely skillful (replaces six workers per shift, in principle can work three shifts without interruption, and by eliminating waiting times, increases labor productivity by 80 percent). What does REMT-1 do? It picks up an unfinished shaft from a rough part storage and places it in an automatic lathe which machines steps of different diameters; at the end of this operation, the robot passes the shaft to a milling machine which cuts a first key slot, then to another milling machine to cut a second key slot; from here, the shaft is picked up and placed in a storage of finished parts. The manufacturing station also includes a second automatic lathe, which eliminates dead time (the lathe operation lasts as long as both milling operations together); this station is flexible, insofar as it can be programmed to fabricate all types of shafts for electric machines being manufactured at Electromotor.

"The robot-equipped work station," we are told by Marin Tanase, director of the enterprise, "was until now manned by 17 workers; these will be replaced by the robot and three operators. The effect? In addition to higher labor productivity, a reduced physical effort (the workers from this station will be assigned to other activities that are less demanding in this respect). We intend to extend this experience to two other work stations, already identified, and in parallel, to specialize a department for the mass production of robots of this type. The performance that you are witnessing did not come out of nowhere, but is the result of our collaboration with the Polytechnical Institute Traian Vuia, a collaboration which began more than 10 years ago and which seeks (through a program that currently

includes more than 50 projects) to optimize the construction of motors produced here, as well as to improve technologic processes. This also explains the natural way in which our robot came to be, in response to production's concrete needs, and not--as in other cases--as a laboratory creation which is looking for a possible application."

Further details about the creation of REMT-1 and about other similar, long range projects, came from a discussion with Prof Kovacs Francisc, dean of the Mechanical Department, and Prof Tiberiu Muresan, dean of the Electrical Department, at the Polytechnical Institute, and coordinators of the comprehensive collective of teachers, students, and production specialists which has successfully completed this first Romanian achievement. We learned for instance, that a decisive role in the implementation of the robotics work being carried out at the Polytechnical Institute, was played by the guidance and indications which the secretary general of the party, Nicolae Ceausescu, formulated in September 1979, during his visit for the opening of the school year. The response has been prompt and full of enthusiasm: a first industrial robot was placed under technologic tests less than one year and eight months after the visit, in honor of the 60th Anniversary of the founding of the RCP.

"A great advantage of automation (and robotics represents the most evolved form of this process) as illustrated here," pointed out Prof Francisc, "is in the implicit obligation to perfect all aspects of the technologic process: not only must the robot adapt to the demands of the process, but the technology must adapt itself to the demands of robotics, i.e., precision, timing, painstaking adjustment of machinery and tools, perfect organization, and so on. The entire technologic process must be reviewed in the light of robot utilization, and even the workers in enterprises must improve their activities; since by definition the robot makes no mistakes, the possible errors of its human collaborators become even more apparent. Our colleagues at Electromotor have undestood this situation very well; we are also planning similar robot installations together with the enterprise Ambalajul Metalic (which among other things manufactures shuttles for looms) and the Timisoara Textile Enterprise (for operations in ring lifting during vicuna weaving, with application in many other mills in the country).

We also learned that as part of the national program for building industrial robots, the Traian Voia Polytechnical Institute coordinated two efforts (building the prehensile devices, the robot's hands, and some of the tactile, proximity, and force-moment sensors) and participated in three other ones (designing the orientation mechanism of the RIC-25 robot, collaborating on control problems, and working in conjunction with others on robot-welding technologies). And finally, the institute's laboratories are making intensive preparations to begin the construction of improved third generation robots (REMT-1, its builders sustain, belongs to the second generation), with more advanced sensors (including visual ones), and with control systems capable of making autonomous decisions (the programs are capable of branching in case of unforeseen situations). The interests of our specialists are thus approaching the peak performances achieved throughout the world in the matter of robotics; for this purpose, the department led by Prof Muresan has built an experimental robot (named PETRICA (Timisoara Experimental Project for an Advanced

Research Intelligent Robot), which was used among other things to model the REMT-1 program. We ended our visit with the feeling of having glimpsed one of the most promising and spectacular illustrations of the integration of education, research, and production.

Once on the firm ground of industrial plants, de-anthropomorphized, freed of their science-fiction aura, robots have assumed their terrestrial vocation of powerful, skillful, and docile helpers for man. Our specialists today contribute fully to this demythization, side by side with technical designers of robots throughout the world.

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OPERATION OF AUTOMATED CASTING LINE DESCRIBED

Bucharest CONTEMPORANUL in Romanian 8 May 81 p 6

[Article by Prof Constantin Bala, pro-rector of the Bucharest Polytechnical Institute]

[Text] Some days change your life a for long time. Others pass by without notice and their significance become apparent only much later. And others yet, reverberate every second with the power of a steam whistle. I consider 23 February 1980 among the latter. Not only for myself, but also for the Bucharest Polytechnical Institute and for a whole branch of the national industry. On this day, the secretary general of the party, Nicolae Ceausescu--visiting the leading metallurgical enterprise of Romania's industry, the 23 August Enterprise--addressed to all the specialists a passionate and rousing call to modernize casting technologies. The Bucharest Polytechnical Institute was assigned the task of building an automated line. Not an easy task, and its urgency led to a concentration of forces unparalleled here. This vast operation mobilized specialists from 12 departments in seven of the institute's schools. Now that the action has reached its end, and that the automated casting line at the 23 August Enterprise has entered its technical testing stage, we can say that the achievement of this goal has been an unprecedented example of education-research-production cooperation. Working together with the staff of the Bucharest Polytechnical Institute have been specialists from many plants (the largest among these being the 23 August Enterprise, the Bucharest Enterprise for Tooling and Spare Parts, the Bucharest Enterprise for Electrical Machinery, Electrotehnica, Automatica, the Bucharest Enterprise for Assembly, Installations, and Automation, and Infratirea of Oradea), research and design institutes (ICSIT--Institute for Scientific Research and Technologic Engineering--Titan, ICSIT PSCI, ICSIT Faur, and so on), and students. In the complex coordinating activity, an important role was played by the Secretariat of the Party Committee of Bucharest, and by the Bureau of the Party Committee of the University Center. The automated line is the first of its kind in the country, and a large part of the system was built for the first time here. I should add that no piece of equipment from current production could be used without modification, and that nearly the entire project was completed in addition to the plan's tasks.

And now for a few technical details. The automated line--designed, partially built, and supervised by the institute until it was placed in operation at the 23 August Enterprise--'s used for casting the collector cover of the MTU engine, a part that is demanding and complicated because of its large dimensions and thin walls, and cooling channels and special geometry (the fabrication of this part by means of other processes requires a great deal of time and manpower, and in most cases the quality is not satisfactory). The casting is performed in metal forms (molds), using the following operations: automated cleaning and painting of the mold; automated positioning of the core; automated feeding of liquid metal; automated extraction of the cast part; mechanized cutting of webs and veins; evacuation of the core; semi-automatic welding of covers necessary to set and evacuate the core; automatic control and testing of the finished part.

I want to emphasize that this involved not only a great effort of energy concentration, but also a large investment of true creativity. The work elicited emotions similar to those of artistic creation, elation and wavering, moments of inspiration, and unexpected problems.

After defining our goal--the automated casting line--and the steps for reaching it, we raised the question of a thorough updating. We rapidly reviewed the advanced research being carried out throughout the world and circled the area of interest: casting in evacuated molds, a method applied in only a few countries. Some of the major advantages of this method over conventional ones are first of all, that the cast parts require less additional processing--with obvious favorable effects on metal consumption and manpower costs; and secondly, that the process also requires much less power. To this we could add a simplification of the technologic process (by reducing the number of steps) and increased production per square meter of floor space. Because the need for a binder in mold formation is eliminated (a role played by the vacuum), the method radically improves working conditions, especially in areas which at present are highly noxious.

We worked with great dedication to adopt this method: often 18 hours a day, for weeks, without rest. Results were soon forthcoming: in August 1980, experiments were started at the pilot line of the School of Metallurgy; and in October 1980, the first parts were cast by this method (in aluminum, at a temperature of 650-730 degrees C; currently, we are casting both steel and iron parts at high temperatures, as well as parts made from non-ferrous alloys or synthetic resins). About 15 patents were filed, and others are being finalized. And during this year, the first industrial installations for casting in evacuated molds were placed in operation at Vulcan, 23 August, and the Grivita Rosie chemical equipment enterprise.

Similar installations are being built at Grivita Rosie, Semanatoarea, the Metal Parts Enterprise for the Textile Industry, the Iasi Heavy Equipment Enterprise, Tehnofrig in Cluj-Napoca, and the Galati Steel Combine. Many other enterprises have expressed interest in the new process, only a few months after voicing a prudent restraint. I believe that the success is due to the convincing demonstrations made at the Polytechnical Institute, regarding the possibilities for implementing the method and its advantages.

The construction of the automated casting line and the adoption of the casting process in evacuated molds in less than one year are prestigious victories not only for the Polytechnical Institute, but for the entire Romanian industry. It proved that when there is a will there is a way, and that the solution of a critical problem can open vistas for the future. We, the staff, researchers, and students of the Polytechnical Institute dedicate our achievements to the glorious anniversary of the party, and we undertake the obligation to further introduce in our integrating activity all the new advances of science and technology, so as to promote the highest level of technical progress in our country's economy and industry.

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